

Even the so-called "Plateau high," an area of high pressure that occasionally lodges over the Great Basin in winter, does not persist on the average over two or three days. There are times, of course, when it persists for a longer period, but on these occasions it is believed that the endurance beyond the average period is due to the inflow of cold air from the northwest. In other words, the Great Basin, owing to the topographic surroundings, actually serves as a basin or reservoir in which part of the cold air which has a slow eastward or southward motion is entrapped.

One of the reasons for entertaining this view is the fact that offshoots from the "Plateau high" are frequently discharged to the eastward or southeastward. After the discharge of an offshoot the parent high soon disintegrates. It is also believed that owing to local radiation, and the drainage of cold air into the valleys occupied by Weather Bureau stations, the sea-level pressures for the Plateau region, are at times greatly affected by these local surface temperature falls.

An area of high pressure *firmly lodged* over the Great Basin is a most important asset to the forecaster, not only on the Pacific slope, but eastward from the Rocky Mountains including the Northern and Central States.

As I said before, according to my experience, there is no distinct pressure formation in this country that approaches a condition of subpermanency. There are times when the highs and lows follow each other in nearly the same path. When this condition prevails it is customary to say that a certain type prevails. The same phenomenon has been observed in Europe: See Nils Ekholm in the January, 1907, *Meteorologische Zeitschrift*, "Über die Unperiodische Luftdruckschwankungen und einige damit zusammenhängende Erscheinungen." (On the nonperiodic pressure variations and some phenomena in connection therewith.)

It seems to me that it would be profitable to study the daily weather maps in periods of less than a month since the latter period is too apt to include the records of more than one type. It might be possible to do this for the Pacific coast where the atmospheric movements are less complicated than in eastern districts.

As an illustration of what one would meet in attempting to correlate monthly mean pressures and weather conditions, I submit, herewith, copies of the monthly mean pressures for March, for the years 1902 to 1906, together with the paths of highs and lows on the Pacific coast and over the Plateau region. But one of these months (March, 1904) shows a steadiness in the movement of lows that would be useful to the forecaster. (Charts XI to XV.)

Aside from the forecasting point of view considerable interest attaches to this subject on account of its bearing upon a rational explanation of climate. In this connection see Bulletin Q, under "Seasonal variations of the weather."

In regard to Professor McAdie's second proposition, I would say that we are never certain that the pressure distribution and the weather conditions existing at any moment of time will match the actual conditions to the eastward in the next twenty-four hours.—A. J. H.

#### CAN WE PROTECT AGAINST TORNADOES?

A well-constructed conductor is a fairly reliable protection against destruction by lightning, but one must be inside the protected building, as there is no assurance of safety on the outside. A dwelling *may* be so constructed as to pass uninjured thru a hurricane, tornado, earthquake, flood, or fire, tho it is rare that such are built, and that which is safe against one kind of visitation may not be so for another.

The following correspondence shows one phase of the question of protection. We should like to have some one compile

enough data to give us a fairly correct idea as to whether it is best to be frightened at every storm cloud and run to the shelter of the "tornado cave," or whether we may not as well be brave and calmly await the dread visitation, since it is most likely to pass us by. As the result of his extensive studies Lieut. John P. Finley maintained that the best we can do is to watch the distant tornado, and if it seems to approach us then move away toward the left; so far as we have learned, this still continues to be the best rule.

#### (1) LETTER FROM A CORRESPONDENT TO THE CHIEF OF BUREAU.

I am going to establish in this city a system which will give us warning of the approach of tornadoes, which is as follows:

We will run a pole line around our city at a distance of four miles, which is connected to an alarm in the city by wires, using the very best of wire and putting up the line in the most substantial manner. There will be two wires on this circuit around the town. We will place instruments a quarter of a mile apart on this line, to be adjusted to short-circuit the wires by making an electric contact, should a change in the atmosphere pressure (of as much as three-tenths of an inch) take place within five minutes.

The magnetic apparatus for giving an alarm in the city is arranged so that if one or both the wires are broken it will cause an alarm to be given, or should the wires touch one another by being twisted together it would give an alarm; also should the instrument short-circuit the wires by the sudden change in the air pressure, we would receive an alarm. We will have notice in advance of the tornado by the time it would take it to travel from the instrument or pole line to the city, and as the line is all around the city, at a distance of four miles, it would be unable to reach the city from any direction without giving us an alarm.

I have kept in touch with the great work that your Bureau is doing under your able management, and I earnestly hope that you and your good workers may live to quite an old age, as you have done much to overcome ignorance and superstition in regard to the many fake ideas of the people in regard to forecasting the weather.

#### REPLY TO THE ABOVE LETTER BY THE EDITOR.

You propose to surround your city by a double line of telegraph wire inclosing an area about 8 miles in diameter or 25 miles in circumference. At every quarter mile of this circumference (100 stations in all) you will place an apparatus that will automatically short-circuit the line whenever the atmospheric pressure rises or falls at the rate of three-tenths of an inch in five minutes, or faster. The wires will also be short-circuited, or an alarm given, if either wire is broken or if the wires touch each other. You think that this system of alarms will protect the city from the unexpected arrival of a tornado.

The statistics of tornado frequency show that a region of 1 square mile any where in Missouri is not very apt to experience a tornado, the probability being one-sixteenth of one per cent per century, so that a region 4 miles square would have a probability of 1 per cent per century; that is to say, it will presumably have a tornado once in ten thousand years. It is therefore probable that your system of wires and apparatus would have to be kept in working order many years before it could be of use; and unless it be kept in perfect repair, at great expense, it will be out of order and useless when the tornado comes. For these reasons many schemes analogous to yours which have been proposed in the last forty years have been abandoned as impracticable. If you have any statistics showing that tornadoes are specially frequent in the neighborhood of ..... I should be glad to receive them and revise this calculation.

You state that you are going to establish your system around .....: does this mean that you are going to do it at the expense of the city, or as a private enterprise?

#### (3) SECOND LETTER FROM A CORRESPONDENT.

In reply to your letter, I will say that I am unable to give you any additional information in regard to the frequency of tornadoes in this State, for the following reasons:

1. That most newspapers, as well as the public in general, call tornadoes "cyclones."

2. I have only been able to visit a few of the damaging storms to ascertain what they were.

3. That I believe that only a small per cent of the tornadoes reach the earth's surface, and it seems to me that it would be difficult on this account to ascertain or even attempt to approximate the number of tornadoes in any locality.

I quite agree with you that it is only a small per cent of tornadoes that do damage in this State, but there are so many dark, dangerous, and threatening-looking clouds that we will be uneasy, and this will cause us to always keep our alarm system in the best of condition for fear that they are tornadoes.

I have only this one life to live, and being healthy and enjoying it there is no expense I would not undergo to protect it, as I prefer living to any other state or condition I can imagine. We will not install this

alarm system because we want frequent tornadoes, but quite on the contrary because we do not, but want to be forewarned when there is one.

The Weather Bureau officials deserve credit for the work that they have done in giving us facts and figures to work from, as well as the many wonderful discoveries they have made. They have taken an uneducated people which had all kinds of superstitious ideas in regard to foretelling the pending weather, based on myths and old traditions, until after a process of evolution and hard work on their part we have now a Weather Bureau superior to any in the world. They educated themselves while educating the masses until they have reached this state of proficiency. All this has been accomplished within the last forty years, and if these same persons are kept in charge of this work, I believe our Bureau will advance as much within the same time in the future. While there is life there is room for progress.

I have read your articles in the *WEATHER REVIEW* and have gained much information in regard to lows and highs and the conditions accompanying them, and it seems to me that there is not much work left undone. I also read what you write with special interest, because it impresses me that you are dealing with facts as you find them regardless of what theory they may upset or uphold; like all true scientists, you are seeking the truth.

I am only a beginner, and any suggestions and information that you will kindly give will be appreciated. I am open to conviction and believe that we all should school ourselves as to be able at the end of each period to slough off the skin of preference or prejudice that may have hardened itself around us during the last period.

#### (4) REPLY SENT TO SECOND LETTER BY EDITOR.

In reply to yours of July 27 I may thank you for saying that the Weather Bureau deserves credit for the work it has done in giving facts and figures, and educating the people above superstitions and errors in regard to the weather; but our efforts to benefit the people will be in vain if, in spite of our facts and figures, you create an unnecessary dread or fright with regard to tornadoes in your locality. I see no reason to believe that your system of telegraph line and automatic signals will give any reliable forewarning of a tornado; and should advise you and the city not to waste money on it. You state your belief that only a small per cent of tornadoes do damage at the earth's surface, in your State, and the rest do not reach the ground. You also add that you can not give any additional information about tornadoes, because the public generally call them *cyclones*. Neither of these ideas is true; the use of two terms, "tornado" and "cyclone," need not produce any confusion in the statistics of frequency. The tornadoes that do damage at the earth's surface are the only ones that need to be counted in any efforts that you make to provide against them; and, as I wrote before, these are so rare that a region four miles square need not expect to have more than one in ten thousand years. If you count every destructive wind and every imaginary tornado far above the ground in the dark and threatening clouds as a proper reason for fright and anxiety, you will produce a wholly unnecessary state of uneasiness and alarm in the community.

You say there is no expense you would not undergo to protect your life, but you do not protect it efficiently by your telegraph line and forewarnings of tornadoes. The chance of your dying from a tornado is not the ten-thousandth part of your chance of dying from disease, accident, lightning, etc., and it would be a wiser policy to spend your money to protect yourself against these. The mere forewarning of a tornado is no protection against its coming.

#### THE OBSERVATORY ON MOUNT ETNA.

Under date of May 16, 1907, at Messina, Sicily, Prof. G. B. Rizzo, the director of the observatory recently built near the summit of Mount Etna, wrote that he was about to start for the summit and to occupy the observatory there for the summer, where he would make a series of observations on the intensity of solar radiation, as measured by means of the Ångström pyrheliometer. This instrument is a duplicate of that which has been used for the past five years by Mr. H. H. Kimball, and on account of the special interest taken in this subject by American students Professor Rizzo proposes to communicate his results for publication in the *MONTHLY WEATHER REVIEW*.

The importance of continuous meteorological work on mountain summits is felt more and more as our knowledge of meteorology progresses. The balloon work and kite work must be supplemented by regular mountain stations; these latter are practicable and inexpensive where balloon work would be impracticable. There are many noble peaks on ocean islands that still remain to be occupied, and even if they can not be occupied immediately, yet the cloud phenomena about their summits should be systematically observed.

The following description of the ascent of Mount Etna is abbreviated from an account by Maj. Albert Woodcock, formerly United States Consul at Catania, Sicily, whose letter was published in the *Sportsman Tourist*, Vol. LXI, New York, July 25, 1903, which contains much interesting information, but we have omitted that which is not appropriate to the *MONTHLY WEATHER REVIEW*.

At 3 o'clock a. m. of August 14 last (1886), a large carriage drawn by two stout horses left Catania to make the ascent of Mount Etna and the descent into Val del Bove. A hammock beneath the carriage and a boot at the rear contained blankets, rugs, overcoats, and rations for a two days' campaign. We were soon looking down upon Catania with its thousands of lights, and upon the beautiful sea.

The moon was at its full. As we ascended the air grew fresher and more bracing; it had been uncomfortably warm in Catania when we left. We were ascending thru a highly cultivated region. Orchards of orange, lemon, almond, and fig and vineyards of grape grow luxuriantly upon the slopes. In an hour and a half we had ascended to Gravina, an unimportant village of low, lava-constructed houses. Two miles higher up we reached the quaint old town of Mascalucia. Perched high up on the side of Mount Etna, it commands fine views of the sea and landscape below. There twilight commenced to steal upon us, and the morning star that had glowed with unusual brilliancy above the Calabrian peaks began to pale. Still higher up we reached the lava village of Torredi Grifo. We were now above the orange belt. In this high altitude in winter are heavy frosts and frequent snows. We now entered upon a barren waste of lava bed, which marks the eruption of 1527.

We arrived at Nicolosi, 2,265 feet above the sea, at 6 o'clock, a. m. Nicolosi is an earthquake-riven town, and has several times been shaken to the ground. The lava flood of May last approached within 1,000 feet of it. It there stands a black, hideous mass, still hot and sending off sulphurous vapors. We rested at Nicolosi for an hour, refreshing ourselves with cold coffee, bread, and cheese.

Signor Orazio Silvestri, professor of chemistry, geology, and mineralogy of the Royal University of Catania, courteously tendered us the use of the observatory. The direct road of ascent is covered by the lava flood of May last from 20 to a 100 feet deep. We were obliged to make a detour around this hideous field of black desolation. We flanked Monti Rossi (the Red Mountains) on the south.

Soon after leaving the Red Mountains, we came to a spur of the lava bed of May last. It was insufferably hot. Our mules quickened their pace in crossing. We had left the cultivated region at Nicolosi and were now entering the wooded belt. The trees were mostly of a young growth of chestnuts. Wood being in great demand, the trees were cut before they reach the ordinary size. In this same wooded region, however, on the west side of Mount Etna, there are several monarchs of the forest that have escaped the woodman's ax. They are said to be the oldest trees living and are without doubt 1,000 years old.

Our ascent was very slow and tiresome to the mules. The last May eruption had covered the ground with volcanic sand. The trees seemed to rise from a black sandy desert, there being no green thing visible but their ramage. We reached Casa del Bosco (House of the Woods) at 10 o'clock a. m., tired and voraciously hungry. We were now at an altitude of 4,216 feet above the sea. Casa del Bosco is the last resting place before the final climb to the summit.

The ascent became steeper and more difficult. We wound around the east side of Mount Castello and ascended between Monti Agnuolo and Frumento. We were above the habitable zone. All appearances of vegetation had ceased. No bird fluttered by us, no cricket chirped. There were no signs of animal or insect life. All about us was black desolation. Sun-lit clouds were hanging upon the crests below us. Our way was over black volcanic sand and loose boulders of lava. We were soon upon Piano del Lago (the plains of the lake). Lava floods have filled it, and it has ceased to be a lake.

Casa Inglese is 9,652 feet above the sea. It is situated at the base of the great cone. It was erected in 1811 by some officers of the British Army; the English at that time occupied Sicily. It is a low one-story building, constructed of lava rock, and stands east and west; in one of the three rooms is a fireplace. This building is the refuge of excursionists to Etna. The observatory now (1886) is a low two-story building surmounted by a dome. It is built of lava rocks, the walls being of unusual thickness, to withstand the frequent shocks of earthquake. It is joined to Casa Inglese, the latter being a lean-to on the south to the former. A telescope and all other instruments requisite for making observations in astronomy, meteorology, etc., have been purchased and will soon be mounted in the building. Owing to the kindness of Professor Silvestri (as before stated) we were in possession of the observatory. Here we found beds, bedding, table, chairs, etc., designed for the use of the scientists; these, for the time being, were ours, and we were supremely comfortable. After an hour's rest our company mustered for the ascent of the great cone. It towered into the heavens 1,200 feet above us, its sides being very steep.

We finally reached the north rim of the crater. The grand old sea and the Calabrian peaks lay outstretched before us. Sun-lit clouds in great